

**Data**

| Valve guide             | Part No.      | Repair stage       | Color coding | OD               | Bore in cyl. head | Overlap | Valve guide ID | Length | Shape of valve guide  |
|-------------------------|---------------|--------------------|--------------|------------------|-------------------|---------|----------------|--------|---|
| Intake                  | 130 050 01 24 | Standard dimension | grey-brown   | 14.050<br>14.043 | 14.030<br>14.035  | + 0.007 | 9.000          | 55.0   |  |
|                         | 130 050 02 24 | Repair stage       | red          | 14.222<br>14.214 | 14.198<br>14.203  | + 0.025 | 9.015          |        |   |
| Exhaust                 | 108 050 06 24 | Standard dimension | grey-brown   | 15.050<br>15.043 | 15.030<br>15.035  | + 0.007 | 11.000         | 45.0   |  |
|                         | 108 050 07 24 | Repair stage       | red          | 15.222<br>15.214 | 15.198<br>15.203  | + 0.025 | 11.018         |        |   |
| Close-fit test pressure |               |                    |              |                  |                   |         | 3500 N         |        |   |

**Special tools**

|   |   |                  |
|---|---|------------------|
| Plug gauge 9 mm dia. intake                       |  11004-8211  | 117 589 03 23 00 |
| Plug gauge 11 mm dia. exhaust                     |   | 117 589 04 23 00 |
| Drive-out punch 9 mm dia. intake                  |  11004-6194  | 110 589 02 15 00 |
| Drive-out punch 11 mm dia. exhaust                |   | 110 589 03 15 00 |
| Plug gauge for valve guide basic bore             |  11004-10787 | 117 589 05 23 00 |
| Hand broach 14.035 mm dia. intake                 |  11004-10587 | 110 589 03 53 00 |
| Hand broach 15.035 mm dia exhaust                 |   | 110 589 02 53 00 |
| Hand broach 14.2 mm dia. intake                   |  11004-6195  | 115 589 00 53 00 |
| Hand broach 15.2 mm dia. exhaust                  |   | 110 589 00 53 00 |
| Guide sleeve for hand broach intake 14.2 mm dia.  |  11004-11415 | 102 589 02 63 00 |
| Guide sleeve for hand broach exhaust 15.2 mm dia. |  11004-10590 | 117 589 00 63 00 |
| Drive-in punch 9 mm dia. intake                   |  11004-6195  | 110 589 00 15 00 |
| Drive-in punch 11 mm dia. exhaust                 |   | 110 589 01 15 00 |
| Reamer 8.99 mm dia. H 7 intake                    |  11004-6197  | 000 589 10 53 00 |
| Reamer 10.99 mm dia. H 7 exhaust                  |   | 000 589 15 53 00 |
| Cylindrical brush 20 mm dia.                      |  11004-11176 | 000 589 10 68 00 |

## Assignment engine -- guide sleeves -- broaches

| Engine | Valve   | Valve guide<br>basic bore<br>mm | Guide sleeve<br>part No. | Side | Broach<br>part No. |
|--------|---------|---------------------------------|--------------------------|------|--------------------|
| 115    | Intake  | 14.2                            | 102 589 02 63 00         | B    | 115 589 00 53 00   |
|        | Exhaust | 15.2                            | 117 589 00 63 00         | B    | 110 589 00 53 00   |

### Note

In case of repair, insert into cylinder heads with series standard-dimension valve guides (grey-brown) standard-dimension valve guides. In advance, ream basic bores with reamers to 14.035 mm dia. (intake) or 15.035 mm dia. (exhaust) so that the overlap will not be too large.

Machine basic bores in which no sufficiently tight seat was achieved with the standard-dimension valve guides (grey-brown) (minimum overlap 0.007 mm) with broaches for repair stage valve guides (red). For this purpose, check basic bores by means of the plug gauge.

Knock broaches through basic bores by means of guide sleeves and using a plastic hammer.

### Checking valve guides

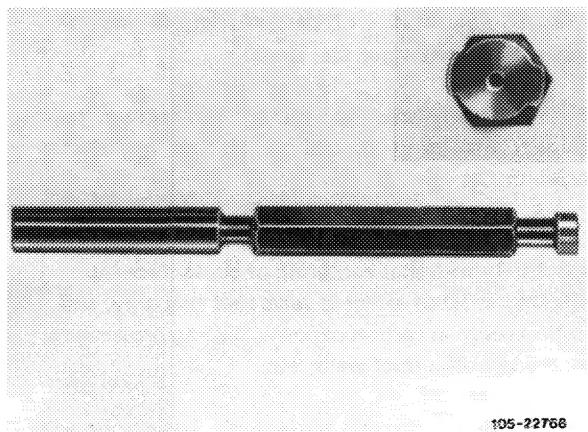
Check valve guides with cylinder head removed in longitudinal and transverse direction at both bore ends by means of plug gauge.

Valve guides permitting to slide-in the spoiled pin with the limit wear dimension (+220) in its entire height (5 mm) must be replaced.

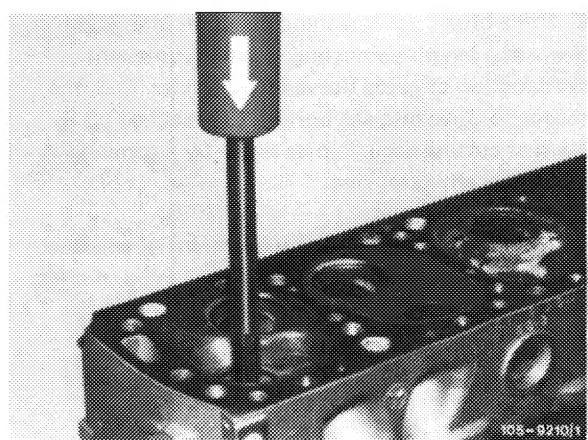
Also replace valve guides that are worn outside at the valve shaft sealing so that there is no more a tight seat of the valve shaft seat.

### Renewing valve guides

1 Knock out valve guides with the knocking-out pin, starting from combustion chamber.



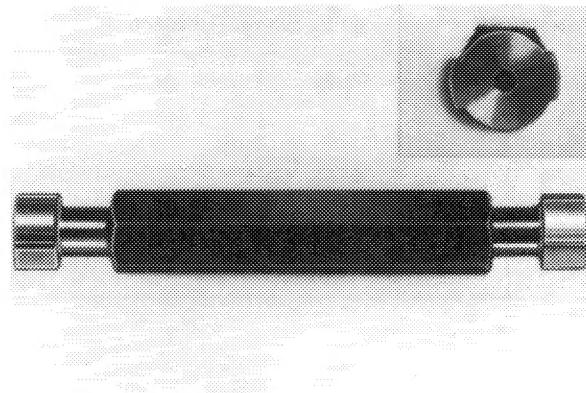
105-22768



105-92101

2 Check valve guide basic bore on both bore ends in longitudinal and transverse directions by means of plug gauge.

Basic bores into which the measuring plug can be inserted at one point in its whole height (8 mm) must be brought to repair stage. In case that the measuring plug cannot, wholly or in part, be inserted, the basic bore for valve guides of normal dimensions can be reamed.



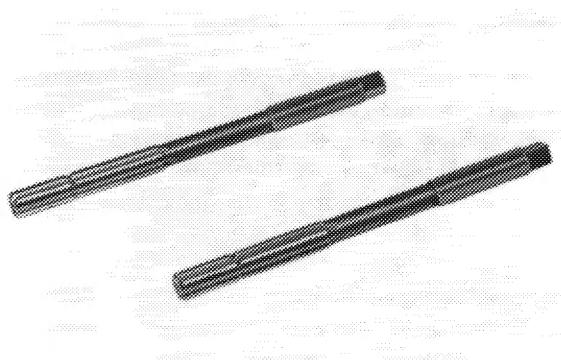
105-22767

### Machining of basic bore

#### Normal dimension

3 Ream basic bores to 14.035 mm dia. or 15.035 mm dia. with the reamer, while lubricating with petroleum. Ream with low pressure and do not tilt reamer. Turn reamer always in forward direction and take out from bore below.

**Note:** Treat reamers with care and store away in their case to prevent damage of the cutting edges.



105-21802

#### Repair stage

4 Thoroughly clean and remove carbon deposits from cylinder head, with particular attention to the inner side of the valve seat rings.

5 Prior to any broaching measures, remove metallic chips from cutting edges of broach (use rigid plastic brush or the like).

6 Select correct guide sleeves (refer to Table). Make absolutely sure that centering of guide sleeve is effected at ID of affected valve seat ring only, and not on residual carbon deposits, casting projections, inlet and outlet duct walls, etc.

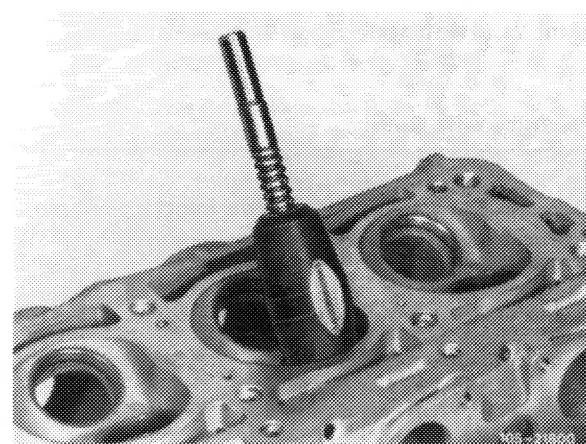
7 Abundantly provide guide sleeve, basic bore, and the whole broach with engine oil.

8 Drive broach in broaching direction into guide sleeve at a length permitting, during subsequent introduction of guide sleeve into cylinder head, the broach to drive into the bore to be broached up to the first cutting edge. Center sleeve by a turning motion in valve seat ring.

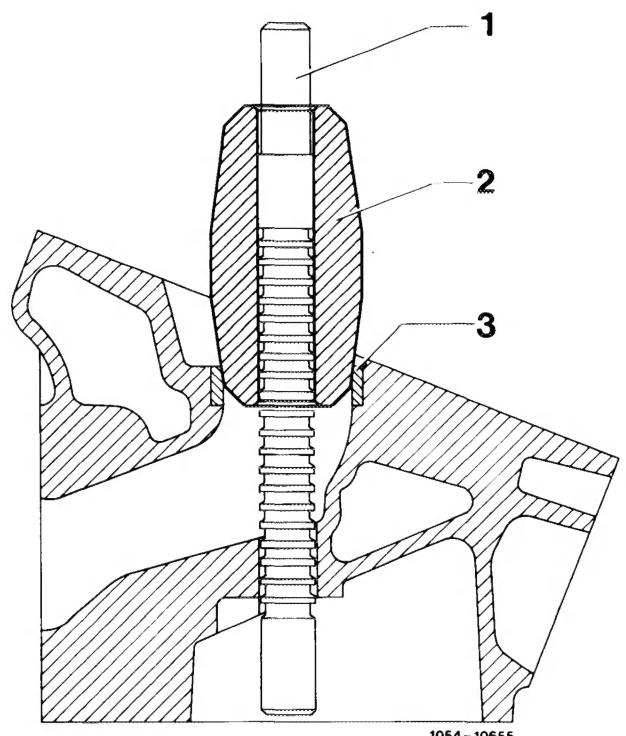
9 Knock the broach through by means of an aluminum mandrel approx. 130 mm long and a plastic hammer of approx. 250 g.



105-21803



105-21804

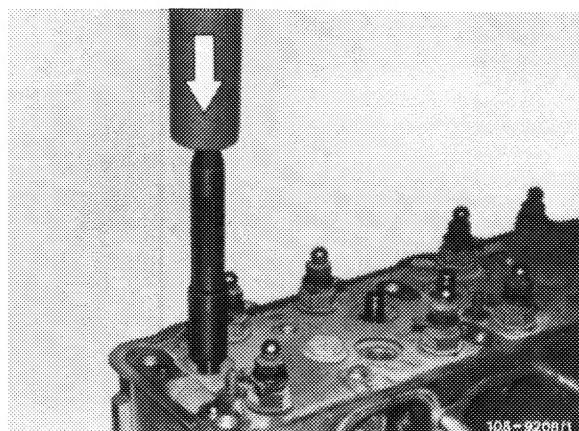


1054 - 10655

#### Inserting valve guide

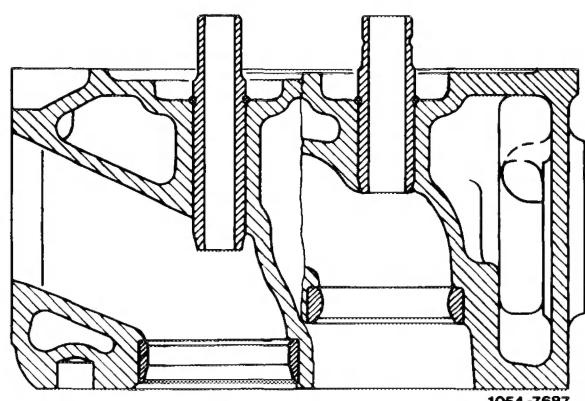
10 Undercool valve guide in liquid nitrogen (for approx. 3 minutes) and insert.

If no liquid nitrogen is available, heat cylinder head in water bath to approx. 80 °C. Coat valve guide with talcum or oil and knock-in by means of knocking-in mandrel until circlip applies to cylinder head.



105 - 9208/1

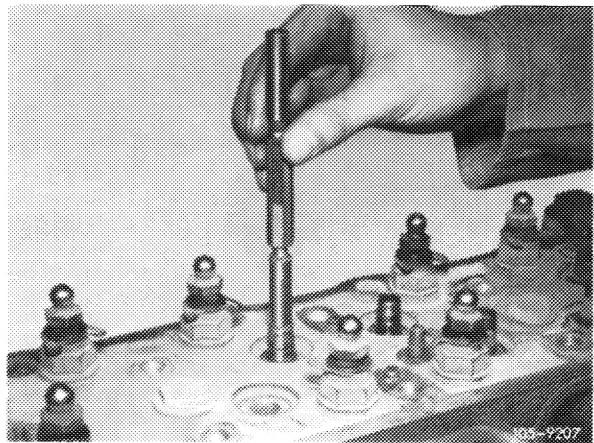
11 Check tight seat of valve guides with cylinder head cooled down only. Tight seat pressure 3500 N.



1054 - 7687

12 Check ID of valve guide with plug gauge.

The go side must completely be insertable.



13 If necessary, ream ID by means of reamer.

14 Check valve seats for out of true, machine, if required.

